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# Panic following trauma: the etiology of acute posttraumatic arousal

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**Abstract**

Two studies examined the contributing factors for panic symptoms following trauma. In Study 1, survivors of sexual and nonsexual assaults ($N = 105$) were assessed at 2 weeks postcrime. Prior trauma, psychiatric history, crime characteristics, and peritraumatic dissociation were assessed. Posttraumatic panic was modestly predicted by childhood sexual abuse (CSA) experiences, a history of Anxiety and Depression, and peritraumatic dissociation. Childhood physical abuse (CPA), Adult Victimization, crime variables, and a prior history of Substance Use disorders and posttraumatic stress disorder (PTSD) were not implicated. In Study 2, the role of peritraumatic panic in predicting later arousal was also examined in a similar sample who were assessed within 6 weeks of their trauma ($N = 93$). Presence of significant arousal during trauma predicted frequency of posttrauma panic attacks, but not its severity. In contrast to Study 1, prior history of PTSD, perception of life threat, and the index trauma being a sexual assault all predicted posttrauma panic, whereas prior trauma exposure and depression did not. These findings are discussed in terms of cognitive and arousal factors that may influence posttrauma panic.


*Keywords:* Trauma; Panic; PTSD; Assault; Physiological arousal

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## 1. Introduction

The association of panic symptoms and response to trauma is receiving increasing attention in the clinical and research field. This has been influenced by research that shows a history of trauma in a substantial proportion of people with panic disorder (David, Giron, & Mellman, 1995; Falsetti, Resnick, Dansky, Lydiard, & Kilpatrick, 1995; Michelson, June, Vives, Testa, & Marchione, 1998; Silove, 1987), and findings that indicate high numbers of trauma survivors report panic attacks following trauma (e.g., Falsetti & Resnick, 1997). Whether panic following trauma is conceptualized as simply an indicator of a physiological symptom of posttraumatic stress disorder (PTSD) in response to a trauma reminder or viewed as a related yet separate phenomenon, assessment of panic provides a useful means of indexing the level of arousal of individuals following trauma. It is interesting to note that although panic responses are often reported to be triggered by trauma reminders, up to 30% of individuals also report uncued panic attacks (Falsetti & Resnick, 1997; Nixon & Bryant, in press). In addition, there are indications that *peritraumatic* panic attacks are common phenomena for trauma survivors. For example, rates of 53–90% among trauma survivors have been found (Bryant & Panasetis, 2001; Resnick, Falsetti, Kilpatrick, & Foy, 1994). Peritraumatic panic has been found to be predictive of intrusive symptoms of PTSD 3 months posttrauma (Resnick, 1997) and acute PTSD (Galea et al., 2002). Clinically, posttrauma panic has significant ramifications. It may interfere with exposure-based therapies if clients are unable to tolerate significant arousal and anxiety (Falsetti, 1997), and given that many trauma survivors continue to suffer panic attacks to trauma triggers, may contribute to the avoidance behaviors commonly seen in PTSD.

Although panic reactions following trauma are gaining increasing attention in the literature, the etiology of such reactions has not been rigorously explored, in particular, during the acute phase following exposure to trauma. Falsetti et al. (1995) have proposed two possible mechanisms that may explain panic after trauma. First, individuals may become conditioned at the time of a trauma to internal and external cues that later become triggers for panic attacks. Second, consistent with Barlow's (1988) proposal of panic disorder, chronic hyperarousal and hypervigilance in PTSD may reduce the arousal threshold required for panic. Chronologically, the first proposal is more likely to account for panic symptoms in the acute phases of trauma recovery, with peritraumatic experiences being responsible for conditioning of the panic response. However pre-trauma variables, such as pre-existing psychological vulnerabilities and prior significant trauma history, may also contribute to the panic reaction. If panic following trauma is conceptualized as a fear response, one would expect that certain variables associated with the trauma (such as perception of life threat, injuries) or even the type of trauma (e.g., sexual assault vs. nonsexual assault) might contribute to the larger fear response. A growing body of literature indicates that PTSD can be predicted by prior trauma history, peritraumatic responses, such as fear, distress and dissociation, as well as

trauma-specific variables such as life threat and receipt of injury (Kilpatrick et al., 1989; Koopman, Classen, & Spiegel, 1994; Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992; Shalev, Peri, Canetti, & Schreiber, 1996; Weiss, Marmar, Metzler, & Ronfeldt, 1995). At this time, however, such research has focused upon predicting posttraumatic symptoms, not panic or arousal reactions per se.

The study of contributing factors to posttraumatic panic would also enable further analysis of the theorized link between increased arousal and dissociation (Friedman, 2000; van der Kolk, van der Hart, & Marmar, 1996). Empirical support for this link has been shown by Bernat, Ronfeldt, Calhoun, and Arias (1998), who studied predictors of PTSD in a college sample. When they conducted mediational analyses, peritraumatic panic symptoms mediated peritraumatic fear and dissociation, lending support to the suggestion that peritraumatic dissociation can be a response to significant arousal.

The current studies investigated contributing factors to short-term arousal experienced following trauma. We examined a number of variables that have been previously associated in the literature with the traumatic response in order to predict acute panic reactions. Although there does not appear to be any literature on predicting posttrauma panic, we intuitively hypothesized in Study 1 that a prior trauma history and a history of psychiatric difficulties could serve as a vulnerability to developing panic-type reactions. We also expected that crime characteristics, such as life threat and receipt of injuries, could potentially make a victimization experience even more frightening, leading to the development of panic symptoms following trauma. Given the strong relationship between dissociation and arousal, it was also predicted that posttraumatic arousal might be sustained by individuals who had exhibited a dissociative-type coping method during the trauma. Availability of data indexing peritraumatic arousal in Study 2 led us to predict that arousal experienced during the traumatic event would be an additional significant predictor of continued arousal in the weeks following trauma and allowed us to test the mediational role that peritraumatic arousal might play on the relationship between peritraumatic fear and dissociation.

## 2. Study 1

### 2.1. Method

#### 2.1.1. Participants and procedure

Participants were part of larger study (Resick, 1991) investigating recovery after physical and sexual assault, and were recruited through police, hospital, and victim service agencies. Participants were all female, over 18 years old, and were interviewed within 2 weeks of their trauma. Participants were excluded if they were illiterate, demonstrated psychosis or were intoxicated at the time of assessment (for consent and validity purposes). Following informed written consent, participants were interviewed by graduate level research assistants

and completed self-report measures (detailed under Section 2.1.2). Thirty participants had incomplete data for four or more measures and were thus dropped from analyses, leaving a final sample of 105 participants.

### 2.1.2. Measures

*2.1.2.1. History of victimization questionnaire (HVQ; Resick, 1991).* Prior traumatic experiences were assessed using the HVQ which was modified for this research project based on an earlier study (Resick, 1982). Guided by previous work (Nishith, Mechanic, & Resick, 2000) we created three reliable subscales to index the level of childhood sexual abuse (CSA) and childhood physical abuse (CPA), and adult victimization experiences (Adult Victimization). The CSA subscale consisted of two items that indexed sexual fondling committed by an adult when the participant was under 17 years of age, and any sexual assault (oral, anal, vaginal, penetrative) committed by an adult when the participant was under 17 years of age. The items were recoded from a five-point scale to a three-point rating (0: *never*, 1: *one to two times*, 2: *more than two times*) and summed. The internal consistency (Cronbach's alpha) was .67. The CPA subscale was created by summing 11 items that measured physical abuse ranging from being pushed or shoved, being hit with an implement such as a belt or stick, to being thrown against a wall or down stairs. The original seven-point scale was recoded to a three-point rating as previously described. The summation of these 11 items resulted in a scale with internal consistency of .91. The Adult Victimization subscale consisted of six items that measured the number of times participants had been exposed to high-magnitude, high-impact traumatic events during adulthood (excluding their current trauma). These events consisted of: (a) rape/sodomy, (b) attempted rape/sodomy, (c) other nonrape sexual assault, (d) physical assault resulting in permanent injuries, (e) physical assault with minor injuries, and (f) attempted murder. The frequency of these events was reduced to following rating: 0 (*never*), 1 (*one to three times*), 2 (*more than three times*) and the items summed to produce a total score with internal consistency of .77.

*2.1.2.2. Physical reactions scale (PRS; Falsetti & Resnick, 1992).* The PRS is a self-report questionnaire that measures frequency and severity of panic attack symptoms over a 2-week period. Frequency ratings are made on a four-point scale (0: *not at all* to 3: *five or more times per week*) and severity on a five-point scale (0: *not all distressing* to 4: *extremely distressing or frightening*). We used the 13 panic attack symptoms from the measure, and the score that was formed by summing the frequency and severity ratings had a Cronbach's alpha of .94. We used Falsetti and Resnick's (1997) criteria for diagnosing panic attacks. That is, participants were deemed to have met criteria for a panic attack if they reported that they had experienced four or more symptoms at the same time and rated this experience at least ''moderately distressing or frightening'' (i.e., a score of 2 or more on the severity scale).

*2.1.2.3. Structured clinical interview for DSM-III-R (SCID; Spitzer, Williams, Gibbon, & First, 1997).* The SCID is an established clinician-administered diagnostic interview for Axis I disorders. Participants were interviewed to determine the presence/absence of a lifetime history of a Mood, Anxiety, or Substance Abuse/Dependence disorders.

*2.1.2.4. Clinician administered PTSD scale (CAPS; Blake et al., 1990).* The CAPS is an established interview-administered diagnostic interview for PTSD with excellent psychometric properties (see Blake et al., 1995, for details). The CAPS was used to establish the presence/absence of a lifetime history of PTSD for traumas other than the current event.

*2.1.2.5. Trauma interview (Resick, 1982; Resick, Jordan, Girelli, Hutter, & Marhoefer-Dvorak, 1988).* This structured interview yielded characteristics and information regarding the participants' trauma experience. Relevant to the current study was information that indexed: perception of life threat, severity of injuries, presence of a weapon in the assault, relationship status of the victim to the assailant, peritraumatic dissociation, and the length of the traumatic event. For life threat, participants were asked (a) "During the incident did you think about being killed or seriously injured?" and (b) "During the incident how certain were that you were going to be killed?" Participants responded on a Likert-type scale ranging from 0 to 4 (0: *none of the time*, 4: *all of the time*). The two responses were summed, and had a Cronbach's alpha of .78. Presence of injuries was coded as follows: 0: *none*, 1: *minor injuries sustained* (e.g., cuts and bruises), 2: *serious injuries sustained* (e.g., broken bones, fractures, internal injuries). The participants' relationship to their assailants was coded as: 0: *stranger*, 1: *acquaintance*, 2: *intimate/ex-intimate*, and length of trauma was coded from 1 (10 min or less) to 7 (more than 8 h). Six items from the Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar, Weiss, & Metzler, 1997) and two additional items asking whether the participant felt "confused or disoriented" or "numb" during the trauma were used to index peritraumatic dissociation. We replaced two of the original with these new items from previous experience that has found these items more appropriate for rape victims (see Griffin, Resick, & Mechanic, 1997, for details). Each item was rated on the 0–4 Likert-type scale described earlier, and Cronbach's alpha for the peritraumatic dissociation index was .67. The presence/absence of a weapon was coded dichotomously.

## 2.2. Results

### 2.2.1. Participant characteristics

The mean age of participants was 31.10 years (S.D. = 8.80) and the average length of education was 12.40 years (S.D. = 2.15). Sixty-two percent of participants were single, 15% were partnered and 22% were separated or divorced. Seventy percent earned less than US$10,000 in the last year. Sixty-nine percent

were African-American, 28% were Caucasian and the remaining 3% were Hispanic. Participants were assessed approximately 2 weeks after their trauma (in days, $M = 15.35$, S.D. $= 7.25$). Fifty-seven percent had been a victim of a sexual assault, and the remaining 43% had been a victim of a physical assault. Six participants had a prior history of Panic Disorder. Results were not altered when analyses were run with and without these participants thus they were retained for all analyses.

*2.2.2. Prediction of posttrauma panic severity and panic attacks*

In order to predict posttrauma panic, we conducted a hierarchical multiple regression. The order of entry was governed by the logical temporal sequence of the predictors. Given the consistent finding that peritraumatic dissociation is associated with poorer outcome following trauma, it was entered on the final step so that its independent contribution could be examined with all other variables controlled. Time since the trauma (measured in days) was not correlated with the severity of posttrauma panic or number of posttrauma panic attacks.

Prior trauma history was entered at the first step, followed by psychiatric history, crime characteristics, and then peritraumatic dissociation. All variables were entered simultaneously on each step, with the total posttrauma panic symptoms score (PRS) entered as the dependent variable. Table 1 details correlational and descriptive data and Table 2 summarizes the regression findings.[1,2] Prior trauma history accounted for 12% of the variance of PRS scores and psychiatric history contributed a further 10%. Although crime characteristics accounted for 5% of the variance, this was not significant. Peritraumatic dissociation, which was entered on the final step, uniquely accounted for a final 9% of the variance of PRS scores, with the overall model accounting for 26% of the variance (Multiple $R = .60$, Adjusted $R^2 = .26$, $F(14, 90) = 3.54$, $P = .000$).

We were then interested in how well CSA, history of Anxiety and Depression, and peritraumatic dissociation identified those who had experienced panic attacks (41%) in the preceding 2 weeks and those who had not (59%). An additional nine participants were deleted from analysis because of missing data regarding presence/absence of panic attacks. Logistic regression analysis showed that a full model of the four predictors was significant against a constant-only model, $\chi^2(4, N = 96) = 10.29$, $P = .036$. Predictive accuracy of the model, however, was modest, with an overall success rate of 68%. Sensitivity of the model was poor, with only 41% of those experiencing panic attacks being correctly identified, compared with the specificity, with which 86% of participants *not* reporting panic attacks were correctly identified. Table 3 summarizes the findings

[1] Demographic variables did not contribute to the prediction of panic in either Study 1 or 2, hence they are not reported.

[2] As one reviewer highlighted, lower social support has been observed to be associated with poorer outcome following trauma. As part of the larger parent study from which participants in Study 1 were obtained, perceived level of social support following the trauma was indexed. Although it was negatively correlated with panic, it was not a significant predictor in any regression analyses.

Table 1
Study 1: correlations, means and standard deviations for predictor variables and PRS scores ($N = 105$)

| Predictors and dependent variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | *M* | S.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. CSA | – | | | | | | | | | | | | | | | 1.08 | 1.37 |
| 2. CPA | .30** | – | | | | | | | | | | | | | | 5.97 | 5.44 |
| 3. Adult Victimization | .52*** | .29** | – | | | | | | | | | | | | | 2.91 | 2.42 |
| 4. Anxiety[a] | .14 | .15 | .14 | – | | | | | | | | | | | | – | – |
| 5. Depression[a] | .28** | .26** | .18 | .22* | – | | | | | | | | | | | – | – |
| 6. Substance[a] | .18 | .02 | .25** | .08 | .18 | – | | | | | | | | | | – | – |
| 7. PTSD[a] | .31** | .18 | .26** | .07 | .14 | .10 | – | | | | | | | | | – | – |
| 8. Life threat | .02 | .07 | −.03 | .11 | −.04 | .14 | −.05 | – | | | | | | | | 4.90 | 2.56 |
| 9. Sexual assault[a] | .10 | .01 | .13 | −.10 | .01 | −.07 | −.02 | .15 | – | | | | | | | – | – |
| 10. Injury severity | .01 | .12 | .25** | .05 | −.09 | −.03 | .02 | −.01 | −.20* | – | | | | | | 1.12 | 0.74 |
| 11. Relationship status | .10 | .01 | .29** | .03 | .08 | .11 | .06 | −.21** | −.21* | .08 | – | | | | | 0.71 | 0.78 |
| 12. Weapon[a] | −.19 | −.02 | −.30** | .10 | −.19 | .00 | −.09 | .23* | −.21* | .04 | .30** | – | | | | – | – |
| 13. Incident length | .01 | .12 | .14 | −.03 | −.17 | .07 | −.01 | .08 | .50*** | .10 | −.03 | −.04 | – | | | 2.26 | 1.43 |
| 14. Dissociation | .04 | .10 | .06 | .07 | .05 | .02 | .06 | .31** | .14 | .18 | −.06 | −.21* | .07 | – | | 12.19 | 6.32 |
| 15. PRS | .32** | .19 | .25** | .28** | .33** | .09 | .25** | .12 | .16 | −.01 | −.08 | −.15 | .05 | .39*** | – | 27.14 | 20.17 |

[a] Correlations with dichotomous variables are Spearman's rank-order correlations.
* $P < .05$.
** $P < .01$.
*** $P < .001$.

Table 2
Study 1: summary of hierarchical regression analysis of posttrauma panic symptoms (PRS): prior trauma, psychiatric history, crime characteristics, and peritraumatic dissociation as predictor variables ($N = 105$)

| Predictors | $B$ | S.E. $B$ | $\beta$ | $\Delta R^2$ | Adjusted $R^2$ | Multiple $R$ | Overall $F$ |
|---|---|---|---|---|---|---|---|
| *Step 1: trauma history* | | | | | | | |
| CSA | 3.51 | 1.64 | .24* | | | | |
| CPA | 0.33 | 0.37 | .09 | | | | |
| Adult Victimization | 0.81 | 0.93 | .10 | .12 | .09 | .34 | $F(3, 101) = 4.40$** |
| *Step 2: psychiatric history* | | | | | | | |
| Anxiety | 8.99 | 4.39 | .19* | | | | |
| Depression | 8.37 | 4.02 | .21* | | | | |
| Substance Use/Abuse | −0.24 | 3.79 | −.01 | | | | |
| PTSD | 5.89 | 4.97 | .12 | .10 | .16 | .46 | $F(7, 97) = 3.75$** |
| *Step 3: crime characteristics* | | | | | | | |
| Life threat | 0.87 | 0.76 | .11 | | | | |
| Sexual assault | 1.32 | 4.70 | .03 | | | | |
| Injury severity | −0.20 | 2.71 | −.08 | | | | |
| Relationship status | −3.81 | 2.67 | −.15 | | | | |
| Weapon | −5.42 | 4.38 | −.13 | | | | |
| Incident length | 0.51 | 1.51 | .04 | .05 | .16 | .51 | $F(13, 91) = 2.50$** |
| *Step 4: dissociation* | | | | | | | |
| Peritraumatic dissociation | 1.13 | 0.31 | .35** | .09 | .26 | .60 | $F(14, 90) = 3.54$*** |

* $P < .05$.
** $P < .01$.
*** $P < .001$.

of the logistic regression analysis, and examination of the *Walds* tests indicated that only peritraumatic dissociation predicted panic attacks following trauma, $Wald = 7.22$, $P = .007$.

## 3. Study 2

### 3.1. Method

#### 3.1.1. Participants

Participants were part of a larger study (Griffin, 1997) investigating the psychophysiological sequelae of trauma and were recruited in the manner previously described, although the time period was slightly longer than in Study 1. Thus participants in Study 2 were seen within 6 weeks of their crime (in days,

Table 3
Study 1: logistic regression analysis to classify panic attacks sufferers following trauma ($N = 96$)

| Variables | *B* | S.E. | Wald | *P* |
|---|---|---|---|---|
| CSA | 0.17 | 0.18 | 0.87 | .351 |
| Anxiety | −0.43 | 0.52 | 0.70 | .402 |
| Depression | 0.09 | 0.48 | 0.04 | .85 |
| Peritraumatic dissociation | 0.10 | 0.04 | 7.22 | .007 |
| (Constant) | −1.51 | 0.70 | 4.63 | .031 |

$M = 32.18$, S.D. $= 16.85$). Sixteen participants had incomplete data for more than four variables and were thus dropped from analyses, leaving a final sample of 93 participants.

### 3.1.2. Measures

Measurement of variables for Study 2 was the same as described in Study 1 for all but psychiatric and trauma history, and perception of life threat. A new variable, peritraumatic arousal, was also indexed in Study 2.

*3.1.2.1. Structured clinical interview for DSM-IV (SCID-IV; First, Spitzer, Gibbon, & Williams, 1996).* The SCID-IV was used to establish a lifetime history of Mood disorders and PTSD. History of Anxiety and Substance Abuse/Dependence disorders was not available in Study 2.

*3.1.2.2. Trauma history.* Participants were assessed for prior traumatic experiences by determining during the trauma interview (described in Study 1) whether they had ever experienced up to nine different types of high-impact stressors, for example, natural disasters, motor vehicle accidents, sexual assaults and witnessing serious injury or death of others. The number of discrete events participants had been exposed to was summed, with the minimum possible score being 0, the highest possible score being 9.

*3.1.2.3. Life threat*. Perception of life threat utilized the same questions as in Study 1 but was scored differently. Instead of responding on a Likert-type scale, participants were asked give a percentage answer ranging from 0 to 100%, where 0: *none of the time*, and 100: *all of the time*. The two responses were summed, and had a Cronbach's alpha of .89.

*3.1.2.4. Peritraumatic arousal*. As part of an ongoing psychophysiological study of response to trauma (not detailed here), participants completed a self-report measure that has previously been used to index the presence/absence of bodily sensations during trauma (Pitman, Orr, Forgue, de Jong, & Claiborn, 1987). For the purpose of the present study, 36 of these responses were deemed to be relevant to the presence of arousal and were representative of panic-type symptoms. Thus

participants indicated whether they experienced sensations such as increased heart rate, sweating, nausea, feeling hot, constricted breathing, etc. Number of possible arousal symptoms (36) exceeded those typically used diagnostically to determine a panic attack (13) due to the fine-tuned measurement of arousal in the present study. For example, in relation to heart rate, participants were asked to indicate whether their heart beat faster, pounded, skipped a beat, raced, or quickened. Normality tests indicated that summation of all possible items was preferable to collapsing item classes.

### 3.2. Results

Preliminary screening showed that 22 participants were missing data for one variable, and one subject was missing data for two variables. Missing data were thus replaced and analyzed using mean substitution.

#### 3.2.1. Participant characteristics

Mean age of participants was 34.30 years (S.D. = 10.80) and the average length of education was 12.44 years (S.D. = 2.18). Fifty percent of participants were single, 13% were partnered, 33% were separated or divorced, and 4% were widowed. Sixty-one percent earned less than US$10,000 in the last year. Sixty-nine percent were African-American, 28% were Caucasian, and the remaining 3% were Hispanic. Eighty percent had been a victim of a physical assault, and the remaining 20% had been a victim of a sexual assault.

#### 3.2.2. Prediction of posttrauma panic severity and panic attacks

Hierarchical multiple regression was conducted in the same manner as Study 1. Prior trauma history was entered at the first step, followed by psychiatric history, crime characteristics (including peritraumatic arousal) and then peritraumatic dissociation. All variables were entered simultaneously on each step, with the total posttrauma panic symptoms score entered as the dependent variable. Table 4 details descriptive statistics, and Table 5 summarizes the regression findings. Contrary to Study 1, prior trauma history did not significantly account for PRS scores, but a prior history of PTSD did (11% variance). Similarly, crime characteristics accounted for an additional 23% of the variance, which was significant. Interestingly, perception of life threat and type of trauma (but not peritraumatic arousal) were responsible for this change; again this finding was inconsistent with Study 1. Consistent, however, with the findings of the first study, peritraumatic dissociation (entered on the final step), uniquely accounted for a final 4% of the variance of PRS scores, with the overall model accounting for 29% of the variance (Multiple $R = .61$, Adjusted $R^2 = .29$, $F(11, 81) = 4.46$, $P = .000$).

Because of the unexpected finding that peritraumatic arousal did not uniquely contribute to the prediction of posttraumatic arousal severity, we were interested in whether the same variables would be predictive of the *number* of posttraumatic

Table 4
Study 2: correlations, means and standard deviations for predictor variables and PRS scores ($N = 93$)

| Predictors and dependent variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | *M* | S.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Trauma history | – | | | | | | | | | | | | 2.58 | 1.69 |
| 2. Depression[a] | .28** | – | | | | | | | | | | | – | – |
| 3. PTSD[a] | .30** | .30** | – | | | | | | | | | | – | – |
| 4. Life threat | −.06 | .07 | .11 | – | | | | | | | | | 115.80 | 75.01 |
| 5. Sexual assault[a] | −.19 | .07 | .01 | .05 | – | | | | | | | | – | – |
| 6. Injury severity | .06 | .15 | .07 | .25* | .02 | – | | | | | | | 1.23 | 0.68 |
| 7. Relationship status | −.01 | .10 | .18 | .13 | −.05 | .09 | – | | | | | | 1.35 | 0.80 |
| 8. Weapon[a] | .14 | .27** | −.02 | .11 | −.28** | .07 | −.25* | – | | | | | – | – |
| 9. Incident length | −.01 | .00 | .05 | .08 | .40*** | −.08 | .07 | −.12 | – | | | | 2.87 | 1.93 |
| 10. Arousal | .01 | −.05 | .08 | .22* | −.01 | .16 | .03 | .01 | .11 | – | | | 11.66 | 5.60 |
| 11. Dissociation | −.02 | .01 | .15 | .30** | .29** | .31** | −.01 | −.16 | .10 | .24* | – | | 12.14 | 6.11 |
| 12. PRS | .06 | .08 | .35** | .31** | .32** | .19 | .13 | −.15 | .25* | .24* | .43*** | – | 21.67 | 18.28 |

[a] Correlations with dichotomous variables are Spearman's rank-order correlations.
* $P < .05$.
** $P < .01$.
*** $P < .001$.

Table 5
Study 2: summary of hierarchical regression analysis of posttrauma panic symptoms (PRS): prior trauma, psychiatric history, crime characteristics, peritraumatic arousal, and peritraumatic dissociation as predictor variables ($N = 93$)

| Predictors | $B$ | S.E. $B$ | $\beta$ | $\Delta R^2$ | Adjusted $R^2$ | Multiple $R$ | Overall $F$ |
|---|---|---|---|---|---|---|---|
| *Step 1: trauma history* | | | | | | | |
| Prior trauma | 0.64 | 1.13 | .06 | .00 | −.01 | .06 | $F(1, 91) = .32$ |
| *Step 2: psychiatric history* | | | | | | | |
| Depression | −1.27 | 5.32 | −.03 | | | | |
| PTSD | 12.68 | 3.90 | .35** | .11 | .08 | .33 | $F(3, 89) = 3.73$* |
| *Step 3: crime characteristics* | | | | | | | |
| Life threat | 0.05 | 0.02 | .21* | | | | |
| Sexual assault | 11.09 | 4.83 | .25* | | | | |
| Injury severity | 3.00 | 2.58 | .11 | | | | |
| Relationship status | 0.24 | 2.23 | .01 | | | | |
| Weapon | −4.36 | 3.88 | −.12 | | | | |
| Incident length | 1.10 | 0.95 | .12 | | | | |
| Peritraumatic arousal | 0.39 | 0.31 | .12 | .23 | .26 | .58 | $F(10, 82) = 4.18$*** |
| *Step 4: dissociation* | | | | | | | |
| Peritraumatic dissociation | 0.70 | 0.31 | .23* | .04 | .29 | .61 | $F(11, 81) = 4.46$*** |

* $P < .05$.
** $P < .01$.
*** $P < .001$.

panic attacks (not the severity of the response per se). Accordingly we conducted the same regression analyses, and found that only peritraumatic arousal and type of trauma (sexual assault) uniquely predicted posttraumatic panic attacks (Adjusted $R^2 = .155$) with the overall model accounting for 17% of the variance (Multiple $R = .518$, Adjusted $R^2 = .169$, $F(11, 81) = 2.70$, $P = .005$).

We then investigated whether peritraumatic arousal would assist in identifying those who had had panic attacks (64%) in the preceding 2 weeks and those who had not (36%). Six participants were deleted from analysis because of missing data regarding presence/absence of panic attacks. Logistic regression analysis showed that a full model of the four predictors (perception of life threat, sexual assault, peritraumatic arousal, peritraumatic dissociation) was significant against a constant-only model, $\chi^2(4, N = 87) = 19.76$, $P = .001$. Like Study 1, the predictive accuracy of the model was modest, with an overall success rate of 71%. Again, the sensitivity of the model (42% of those experiencing panic attacks were correctly identified), was not as strong as the specificity of the model, where 87% of participants *not* reporting panic attacks were correctly identified. Table 6

Table 6
Study 2: logistic regression analysis to classify panic attacks sufferers following trauma ($N = 87$)

| Variables | *B* | S.E. | Wald | *P* |
|---|---|---|---|---|
| Life threat | 0.01 | 0.00 | 4.43 | .035 |
| Sexual assault | −1.15 | 0.64 | 3.25 | .072 |
| Peritraumatic arousal | 0.06 | 0.05 | 1.65 | .199 |
| Peritraumatic dissociation | 0.07 | 0.05 | 1.92 | .165 |
| (Constant) | −2.26 | 1.04 | 4.75 | .029 |

summarizes the findings of the logistic regression analysis, and examination of the *Walds* tests indicated that perception of life threat was the only significant predictor of panic attacks following trauma, $Wald = 4.43$, $P = .035$.

### 3.2.3. Peritraumatic arousal as a mediator

Given that we had indexed peritraumatic arousal in Study 2, we were in a position to test the proposal that peritraumatic dissociation is a response to increased arousal during trauma. Accordingly, mediational analyses were conducted (in line with Baron & Kenny, 1986; Bernat et al., 1998). In the case of a fear-arousal-dissociation model, traumatic fear (in this case, measured by perception of life threat) should predict peritraumatic arousal, and then (separately) traumatic fear should predict peritraumatic dissociation. Mediation is tested in the final analysis when traumatic fear and arousal are used simultaneously to predict dissociation. If arousal mediates the relationship between fear and dissociation, the significant relationship between fear and dissociation is reduced because the effect of arousal is now controlled.

Results of the above mediational analyses are displayed in Table 7. In contrast to the findings of Bernat et al. (1998), analyses did not support a fear-arousal-dissociation model. Perception of life threat (fear) predicted both arousal and dissociation, and remained a significant predictor even when arousal was entered into the regression equation. Thus, in this sample of crime victims, perception of life threat predicted dissociation irrespective of levels of arousal during the trauma.

Table 7
Study 2: the mediating effect of peritraumatic arousal on the relationship between life threat and peritraumatic dissociation ($N = 93$)

| Predictor(s) | $\beta$ | *t* | Adjusted $R^2$ | Overall *F* |
|---|---|---|---|---|
| Regression 1: threat predicting arousal | .22 | 2.19* | .04 | $F(1, 91) = 4.78$* |
| Regression 2: threat predicting dissociation | .30 | 3.02** | .08 | $F(1, 91) = 9.14$** |
| Regression 3: threat and arousal predicting dissociation | | | | |
| Threat | .26 | 2.59* | | |
| Arousal | .18 | 1.77 | .10 | $F(2, 90) = 6.25$** |

* $P < .05$.
** $P < .01$.

## 4. Discussion

To our knowledge, this is the first study to examine both pre-existing vulnerabilities and trauma-related variables in an effort to account for posttraumatic panic. The observation that between 41 and 64% of the sample reported experiencing panic attacks in the 2 weeks prior to assessment is comparable to previous reported rates (69%, Falsetti & Resnick, 1997; 47%, Nixon & Bryant, in press). Findings in both studies were somewhat consistent with the hypothesized predictions. In Study 1, the severity of posttraumatic panic (PRS) was predicted by level of child sexual abuse, prior history of Depression and Anxiety, and peritraumatic dissociation, with the final model accounting for 26% of the variance in PRS scores. Interestingly, neither a history of PTSD nor any crime variables were related to posttrauma panic. Also of note was that sexual trauma as a child appeared to have a significant relationship on adult panic symptoms, in contrast to the finding of Nishith et al. (2000) which found CSA had a indirect link to adult posttrauma response, and direct relationship with prior adult victimizations. When the aforementioned variables were used to differentiate those who had experienced panic attacks from those who had not, prediction was modest, and was more accurate in identifying true negatives. Of the variables identified in the regression as being significant predictors, only dissociation was useful in determining the presence/absence of panic attacks in the 2 weeks following trauma.

Although a similar sample of crime victims was examined in Study 2, several discrepant findings stood out. First, trauma history (albeit measured differently) did not predict posttraumatic panic severity. Second, a history of PTSD, not depression, became a significant predictor. Third, the perception of life threat and type of trauma (sexual assault) made significant contributions to the severity of the posttraumatic panic response, and contrary to expectation, peritraumatic arousal did not contribute to prediction of panic. Consistent with Study 1, however, was the finding that peritraumatic dissociation remained a significant predictor. This is particularly noteworthy given that in both studies dissociation was entered as a final variable in the regression analyses, when other potentially contributing variables such premorbid psychological vulnerability, life threat and trauma type had been controlled. The overall variance in PRS scores accounted for in Study 2 (29%) was comparable to the first study. While peritraumatic arousal did not predict severity of panic symptoms, it did predict the frequency of panic attacks participants reported in the 2-week interval prior to assessment, as did trauma type. As in the first study, specificity was superior to sensitivity in determining the presence/absence of panic attacks, with the perception of life threat being the only significant predictor. Contrary to the findings of Bernat et al. (1998), mediational analyses did not support a fear-arousal-dissociation model in the current data, but indicated that perception of life threat during the trauma remained an independent predictor of peritraumatic dissociation. Differences in terms of how life threat and peritraumatic arousal were assessed may explain why

arousal did not mediate the relationship between fear and dissociation in the present study compared with the study of Bernat et al. In addition, Bernat et al. also relied on retrospective reporting of both traumatic events and peritraumatic emotional responses, and state that in their college sample, traumatic exposure typically began in adolescence. It is also noteworthy that a broad range of traumas were indexed, whereas the current study focused exclusively on sexual or physical assault.

Several methodological factors may account for the observed discrepancies between Study 1 and Study 2. First, there was a difference between the studies in terms of the time since trauma and assessment date. It is possible that in the acute phase of the trauma response, a difference of even a month might alter how panic is experienced, as well as having a differential effect on the variables that contribute to posttraumatic arousal. Second, different versions of the SCID were used to assess lifetime psychiatric history to accommodate changes in DSM (DSM-III-R in Study 1; DSM-IV in Study 2). Differences, however, between DSM-III-R and DSM-IV for the diagnoses of interest were generally minor, and were not felt to have a major influence on the reported findings. A third factor, however, was believed to be influential: the assessment of prior trauma history. This was not assessed extensively in Study 2, and the collected information did not allow differentiation of childhood versus adulthood victimization, especially in relation to sexual abuse/assault. Because the classes of traumatic events experienced were simply tallied in Study 2, it is possible that an individual may have had multiple experiences of a similar trauma (e.g., several sexual assaults) but would only have been coded as having experienced a sexual assault. Finally, peritraumatic arousal was not measured using the PRS, but dichotomous arousal words, and this might not have been as fine-tuned a measure of panic symptoms as the PRS. Although the measurement of peritraumatic arousal had good internal consistency, it only correlated modestly with the combined PRS scale, but better with the number of panic attacks, which may account for why peritraumatic arousal was predictive of the frequency of panic attacks but not their severity.

The finding that peritraumatic dissociation predicted ongoing arousal was intriguing. Peritraumatic dissociation has been posited to interfere with recovery after trauma by impeding proper integration of trauma memory (Foa & Hearst-Ikeda, 1996). It is possible that in the case of panic, individuals with a tendency to dissociate may be unable to habituate to symptoms of arousal. An alternative explanation is that a dissociative response might prevent realistic interpretations of physical symptoms, that is, that such symptoms are in fact not dangerous. Since neither of the current studies investigated participant's attributions for their panic symptoms, the role of cognitions in the relationship between dissociation and panic symptoms is unclear. Maladaptive interpretations of physical symptoms, however, have been found in previous studies of acutely traumatized individuals (Nixon & Bryant, 2001; Smith & Bryant, 2000), and are a hallmark feature of individuals with panic disorder (Richards, Austin, & Alvarenga, 2001), suggesting that further investigation of such cognitions is warranted.

We recognize the limitations of both studies. First, participants were all female victims of crime. Whether the current findings can be generalized to a noncrime or male sample is thus unknown. Second, we were not able to examine the proposition that the results might have been influenced by the *type* of panic attack (cued by a trauma reminder vs. uncued). Third, our findings were restricted to participants' self-report of posttraumatic arousal. Future studies examining the psychophysiology of posttraumatic panic would extend our understanding of this phenomenon. Despite these limitations, the present results justify the investigation of panic in traumatized populations. A recent innovation of combining panic and trauma treatments (e.g., Falsetti, Resnick, Davis, & Gallagher, 2001) is one of a number clinically relevant lines of research necessary in further studies of posttraumatic panic.

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